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## NOTICE OF ALLOWANCE AND FEE(S) DUE

38107 7590 03/10/2009

PHILIPS INTELLECTUAL PROPERTY & STANDARDS  
595 MINER ROAD  
CLEVELAND, OH 44143

EXAMINER

BOR, HELENE CATHERINE

ART UNIT

PAPER NUMBER

3768

DATE MAILED: 03/10/2009

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/553,770

06/19/2006

Holger Schmitt

PHDE030127US

7743

TITLE OF INVENTION: APPARATUS FOR ANGIOGRAPHIC X-RAY PHOTOGRAPHY

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1510	\$300	\$0	\$1810	06/10/2009

**THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.**

**THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.**

### HOW TO REPLY TO THIS NOTICE:

#### I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

**IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.**

# **PART B - FEE(S) TRANSMITTAL**

**Complete and send this form, together with applicable fee(s), to: Mail Mail Stop ISSUE FEE  
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INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

38107 7590 03/10/2009

**PHILIPS INTELLECTUAL PROPERTY & STANDARDS**  
595 MINER ROAD  
CLEVELAND, OH 44143

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

## **Certificate of Mailing or Transmission**

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/553,770 06/19/2006 Holger Schmitt PHDE030127US 7743

TITLE OF INVENTION: APPARATUS FOR ANGIOGRAPHIC X-RAY PHOTOGRAPHY

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1510	\$300	\$0	\$1810	06/10/2009

EXAMINER	ART UNIT	CLASS-SUBCLASS
BOR, HELENE CATHERINE	3768	600-431000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

- (1) the names of up to 3 registered patent attorneys or agents OR, alternatively, 1 \_\_\_\_\_
- (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. 2 \_\_\_\_\_
- 3 \_\_\_\_\_

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

- ☐ Issue Fee
- ☐ Publication Fee (No small entity discount permitted)
- ☐ Advance Order - # of Copies \_\_\_\_\_

4b. Payment of Fee(s); (Please first reapply any previously paid issue fee shown above)

- ☐ A check is enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached.
- ☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number \_\_\_\_\_ (enclose an extra copy of this form).

5. Change in Entity Status (from status indicated above)

- ☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. ☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature \_\_\_\_\_

Date \_\_\_\_\_

Typed or printed name \_\_\_\_\_

Registration No. \_\_\_\_\_

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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10/553,770	06/19/2006	Holger Schmitt	PHDE030127US	7743
38107	7590	03/10/2009	EXAMINER	
PHILIPS INTELLECTUAL PROPERTY & STANDARDS 595 MINER ROAD CLEVELAND, OH 44143			BOR, HELENE CATHERINE	
			ART UNIT	PAPER NUMBER
			3768	
DATE MAILED: 03/10/2009				

## Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 214 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 214 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

<b>Notice of Allowability</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/553,770	SCHMITT ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	HELENE BOR	3768	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 04/08/2008.
2. ☒ The allowed claim(s) is/are 1-10 and 12.
3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) ☒ All    b) ☐ Some\*    c) ☐ None    of the:
    1. ☐ Certified copies of the priority documents have been received.
    2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).
  - \* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.
  - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review ( PTO-948) attached
    - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.
  - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.

**Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

- |   |  |
|---|--|
| <ol style="list-style-type: none"> <li>1. <input type="checkbox"/> Notice of References Cited (PTO-892)</li> <li>2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)</li> <li>3. <input type="checkbox"/> Information Disclosure Statements (PTO/SB/08),<br/>Paper No./Mail Date _____</li> <li>4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit<br/>of Biological Material</li> </ol> | <ol style="list-style-type: none"> <li>5. <input type="checkbox"/> Notice of Informal Patent Application</li> <li>6. <input type="checkbox"/> Interview Summary (PTO-413),<br/>Paper No./Mail Date _____.</li> <li>7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment</li> <li>8. <input type="checkbox"/> Examiner's Statement of Reasons for Allowance</li> <li>9. <input type="checkbox"/> Other _____.</li> </ol> |
|---|--|

### EXAMINER'S AMENDMENT

1. An Examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Douglas McKnight on February 26, 2009. Applicant agreed to amend claims 1-10 & 12 to correct grammatical errors and avoid confusion with U.S.C. § 112, 6<sup>th</sup> paragraph. The amendments were not made to overcome prior art, nor were the amendments intended to change the scope of the claimed subject matter.

The application has been amended as follows:

1. An X-ray imaging device with an image processing device ~~computer means~~ which is provided for visualizing blood flow in a coronary vascular tree of a patient such that the visualization is effected based on data which contain a first set of X-ray projection images of the vascular tree in various phases of a heart cycle, a first ECG of the patient recorded simultaneously with the first set, a second set of X-ray projection images recorded during or after administration of a contrast agent and a second ECG of the patient recorded simultaneously with the second set, ~~which~~ wherein the image processing device ~~computer means~~ comprises ~~comprise~~ a program control which operates in accordance with the following method steps for determining a time-dependent concentration of the contrast agent within a three- dimensional structure of the vascular tree:

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reconstructing[ion of] the three-dimensional structure of the vascular tree during the various phases of the heart cycle using the first set of X-ray projection images and splitting of the structure into a number of vascular segments;

determining the time-dependent concentration of the contrast agent within the reconstructed three-dimensional structure of the vascular tree by

[a]a) assigning[ment of] the second set of X-ray projection images to a respective phase of the heart cycle using the recorded second ECG;

[b]b) finding local image areas assigned to the ~~individual~~ vascular segments within the second set of X-ray projection images corresponding to spatial positions of the vascular segments in the respective phase of the heart cycle according to the three-dimensional structure of the vascular tree;

[c]c) determining the concentration of the contrast agent within the vascular segments by evaluating an X-ray absorption within the local image areas found in the method step [b]b); and

generating a visualization of flow of the contrast agent through the three-dimensional structure of the vascular tree according to the time-dependent concentration of contrast agent: wherein the recording of the first and second set of X-ray projection images is effected at a plurality of projection angles.

2. The X-ray imaging device as claimed in claim 1, wherein the second set of X-ray projection images is recorded during or after the administration of the contrast agent, while the vascular tree fills with the contrast agent and then the first set of X-ray

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projection images is recorded after the vascular tree is completely filled with the contrast agent.

3. The X-ray imaging device as claimed in claim 1, further comprising means for generating the first and the second set of X-ray projection images of the coronary vascular tree of the patient under various projection directions and means for recording the ECG of the patient during the recording of the first and second sets of X-ray projection images.

4. The X-ray imaging device as claimed in claim 2, wherein the ~~computer means~~ image processing device is ~~are~~ arranged such that during or after the administration of the contrast agent the second set of X-ray projection images is recorded while the vascular tree fills with contrast agent, and subsequently the first set of X-ray projection images is recorded, after which the vascular tree completely fills with the contrast agent.

5. The X-ray imaging device as claimed in claim 2, wherein the ~~computer means~~ image processing device is ~~are~~ further arranged such that the recording of the first and second set of X-ray projection images at the plurality of projection angles is by means of continuous rotation X-ray imaging.

6. The X-ray imaging device as claimed in claim 1, wherein the ~~computer means~~ image processing device is ~~are~~ arranged such that [for] reconstructing the three-

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dimensional structure of a computer-aided modeling of the vascular tree is effected while eliminating the other anatomical structures contained in the first set of X-ray projection images.

7. A computer readable medium comprising a computer ~~Computer~~ program for an X-ray imaging device for visualization of the blood flow in a coronary vascular tree of a patient, wherein the computer program receives as input variables data which contain a first set of X-ray projection images of the vascular tree in various phases of a heart cycle, a first ECG of the patient recorded simultaneously with the first set, a second set of X-ray projection images recorded during or after the administration of a contrast agent and a second ECG of the patient recorded simultaneously with the second set, wherein an image processing device when executing the computer program ~~which computer program on the image processing device of the X-ray imaging device implements a program control which~~ operates in accordance with the following method steps for determining a time-dependent concentration of the contrast agent within a three-dimensional structure of the vascular tree:

reconstructing~~ion of~~ the three-dimensional structure of the vascular tree during the various phases of the heart cycle using the first set of X-ray projection images and splitting of the structure into a number of vascular segments;

determining the time-dependent concentration of the contrast agent within the reconstructed three-dimensional structure of the vascular tree by



[a]a) assigning[ment of] the X-ray projection images of the second set to a respective phase of the heart cycle using the recorded second ECG;

[b]b) finding local image areas assigned to the ~~individual~~ vascular segments within the X-ray projection images of the second set that correspond to spatial positions of the vascular segments in the respective phase of the heart cycle according to the three-dimensional structure of the vascular tree;

[c]c) determining the concentration of the contrast agent within the vascular segments by evaluating an X-ray absorption within the local image areas found in the method step [b]b); and

generating a visualization of flow of the contrast agent through the three-dimensional structure of the vascular tree according to the time-dependent concentration of the contrast agent wherein the recording of the first and second set of X-ray projection images is effected at a plurality of projection angles.

8. An X-ray imaging method for visualizing blood flow in a coronary vascular tree of a patient having the following method steps:

a) recording a first set of X-ray projection images of the vascular tree during various phases of a heart cycle while simultaneously recording a first ECG of the patient, the recording of the first set of X-ray projection images being performed at a plurality of projection angles;

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b) reconstructing[ion of] a three-dimensional structure of the vascular tree during the various phases of the heart cycle from the first set of X-ray projection images and splitting of the structure into a number of vascular segments;

c) recording of a second set of X-ray projection images of the vascular tree during or after administration of a contrast agent while a second ECG of the patient is being recorded, the recording of the second set of X-ray projection images being performed at a plurality of projection angles;

d) determining a time-dependent concentration of the contrast agent within a three-dimensional structure of the vascular tree as reconstructed in the method step b) by

aa) assigning[ment of] the X-ray projection images of the second set to a respective phase of the heart cycle using the recorded second ECG;

bb) finding local image areas assigned to the ~~individual~~ vascular segments within the X-ray projection images of the second set corresponding to spatial positions of the vascular segments in the respective phase of the heart cycle according to the three-dimensional structure of the vascular tree;

cc) determining the concentration of the contrast agent within the vascular segments by evaluating an X-ray absorption within the local image areas found in the method step bb);

e) generating a visualization of flow of the contrast agent through the three-dimensional structure of the vascular tree according to a time-dependent concentration of the contrast agent determined in method step d).

9. The X-ray imaging method as claimed in claim 8, wherein the second set of X-ray projection images is recorded during or after the administration of the contrast agent, while the vascular tree fills with the contrast agent and then the first set of X-ray projection images is recorded after the vascular tree is completely filled with the contrast agent.

10. The X-ray imaging method as claimed in claim 8, wherein the recording of at least one of the first and second set of X-ray projection images is effected using continuous rotation X-ray imaging at a plurality of projection angles.

12. The X-ray imaging method as claimed in claim 8, wherein a computer-aided modeling of the vascular tree, with elimination of other anatomical structures contained in the first set of X-ray projection images, is effected to reconstruct the three-dimensional structure in method step b).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to HELENE BOR whose telephone number is (571)272-2947. The examiner can normally be reached on M-T 8:30am-6:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Long V. Le can be reached on (571)272-0823. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/H. B./  
Examiner, Art Unit 3768

/Eric F Winakur/  
Primary Examiner, Art Unit 3768